

A.A.A.S. BULLETIN

VOL. 1

JUNE, 1942

No. 4

Published monthly by the American Association for the Advancement of Science. Office of Publication, North Queen St. and McGovern Ave., Lancaster, Pa. Editorial and Business Office, Smithsonian Institution Building, Washington, D. C., to which office all communications should be addressed.

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Single copy, 10 cents; annual subscription, \$1.00.

Entered as second-class matter at Lancaster, Pa., March 24, 1942, under the Act of August 24, 1912.

Concentration of Power

It has often been pointed out that within a very short interval of time, as human history goes, the applications of science have greatly increased the mechanical forces men control. For example, instead of driving a team of horses the engineer of a power plant directs the flow of a thousand or even a hundred thousand horsepower. One of the consequences of such development of sources of energy is that the average cost of transporting a ton of freight a mile by railroad has been reduced to less than one cent; or perhaps a better illustration is that the average cost of a horsepower of electric energy for a day is less than the wages of a skilled laborer for ten minutes. By such means science has created within a few decades a world of leisure and of luxuries which immeasurably surpass all the highest hopes of earlier generations.

But there are other concentrations of power besides those relating to transportation and manufacturing that in the long run may have much greater consequences than any material achievements, some of which may be beneficial and some disadvantageous. Indeed, the flush now on the cheek of civilization may be in part that of developing disease as well as that of elation at the technological triumphs of science. Scientists may be unwittingly responsible for changes in human relations that will eventually sweep away their liberties.

It is clear that the amazing economies in production and distribution at the present time are possible only because of the creation of great industrial and transportation organizations to provide and use efficiently the forces science has

made available. In the nature of the case, the vast resources of these organizations must be controlled and managed by a relatively small number of men. The managers of the great corporations have almost invariably risen from the ranks of workers purely on the basis of merit, and with relatively few exceptions they have served their companies and society exceedingly well. Yet they control financial resources undreamed of before this industrial age.

Large producing organizations require great concentrations of workers, and the workers in practically all cases are directed and controlled by a relatively small number of labor leaders. These leaders have risen from the ranks because of qualities that are necessary for the positions they hold. Their direct control over the millions of members of their unions and their indirect influence on the lives of tens of millions of other citizens are other consequences of the applications of science. Such opportunities for control, whether of money or men, often arouse ambitions for power.

A third concentration of power, namely political, is necessary to control the complex relations between capital and labor. For a generation political power, particularly in the executive branch of government, has been increasing at a continually accelerated rate. As recently as the nineties President Cleveland declined to approve a Federal appropriation for relief of sufferers from a flood in the Mississippi Valley on the ground that to do so would transcend the powers of the Federal government under the Constitution. Now even the Bill of Rights is giving way under the pressures of the acute new problems that are continually arising. Although many traditional liberties are being curtailed, there is yet a degree of universal freedom in the United States that has seldom existed in the world. However, the great concentrations of power that have been enumerated are of such recent origin that their possible consequences have not had time to unfold.

Of the conclusions that may be drawn from the foregoing considerations, perhaps the most im-

portant for scientists is that instead of living aloof from the world they are introducing new factors that both directly and indirectly are rapidly and profoundly changing the whole organization of society and the interrelations among men. The irreversible tides in the affairs of men they have been starting are sweeping humanity towards a goal that lies unseen beyond a distant horizon. Perhaps their minds would be easier and their hopes higher if they had laid the foundations for some clear new moral principle—if they had placed some steady new light in the sky for the mass of men to follow.—F. R. M.

The Theobald Smith Award

Each year the Association offers a \$1,000 award and bronze medal, provided by the Eli Lilly Company of Indianapolis. The purpose of the award is to recognize demonstrated research in the field of medical sciences, taking into consideration independence of thought and originality. Nominees for the award must have been not over 35 years of age on January 1 in the year in which the award is made.

Nominations for the award are now desired. Any Fellow of the Association, except members of the Award Committee, may submit the name of a proposed recipient. Each nomination must be accompanied by six copies of a biographical sketch of the nominee and six copies of reprints of each principal paper of which the nominee is the author. Nominations and supporting material should be sent to Dr. Malcolm H. Soule, Secretary of the Section on Medical Sciences (N), Hygienic Laboratory, University of Michigan, Ann Arbor, Mich. Dr. Soule is also Secretary of the Award Committee.

At an appropriate time after the Award Committee has made its decision, the name of the successful nominee is announced and he is informed that he is expected to prepare a paper for a meeting of the Association at which the presentation of the award is made. The recipient is allowed, in addition to the cash award, \$150 in lieu of traveling expenses in order to attend the meeting.

Winners of the awards and their principal fields of research have been:

Dr. Robley D. Evans, Massachusetts Institute of Technology, Cambridge, Mass. "A Study of Radium Poisoning."

Dr. Charles F. Code, The Mayo Foundation of the University of Minnesota, Rochester, Minn. "The Blood Histamine in Normal and Certain Abnormal Conditions."

Dr. Albert B. Sabin, Rockefeller Institute for Medical Research, New York City. "Constitutional Barriers to the Involvement of the Nervous System by Certain Viruses."

Dr. Herald R. Cox, Rocky Mountain Laboratory, Hamilton, Mont. "Cultivation of Rickettsiae of the Rocky Mountain Spotted Fever, Typhus, and Q-Fever Groups in the Embryonic Tissues of Developing Chicks."—S.W.

Source Books in the History of the Sciences

The fundamental aim of the series of Source Books in the History of the Sciences is to make possible a wider use of the source material of the major sciences. Such material is now housed for the most part in the libraries of the larger universities and is not readily available. Not all of it is equally valuable, but the most significant contributions of outstanding scientists during the last few centuries are practically priceless, and it is these that have been sought for this series. Men thoroughly familiar with the history of their respective sciences have been secured to determine what should be included in the several volumes, one for each field. The original plan covered merely the period from about 1400 A.D. down to 1900.

The plan, as it was first developed, called for a single volume each in Mathematics, Astronomy, Geology, Physics, Chemistry, Botany, and Zoology. The first volume, a *Source Book in Astronomy* by Shapley and Howarth, was published early in 1929; a *Source Book in Mathematics* by David Eugene Smith followed later in the same year; a *Source Book in Physics* by Magie came from the press in 1935 and a *Source Book in Geology* by Mather and Mason appeared in 1939. All of these have sold well, comparatively speaking, although no one of them has been a bonanza, but that was not expected. The royalties from two of them have equalled the cost of preparing the respective manuscripts and now go to their special editors.

C. E. Allen of the University of Wisconsin is developing the manuscript for the volume on Botany. This volume is about two-thirds or three-fourths finished. William M. Smallwood of Syracuse University is working on the volume for Zoology, and H. G. Fletcher, Jr., of the Massachusetts Institute of Technology, is preparing the manuscript for a volume on Chemistry. All three, it is hoped, will be completed within the next two or three years. A volume on Physiology and one on Anthropology are being considered.

After the series got well under way, the plan was enlarged to include a *Source Book in Greek Science* by Morris R. Cohen of the College of the City of New York and I. E. Drabkin of the Johns Hopkins University, and a *Source Book in Medieval Science* by Richard McKeon of the University of Chicago. The manuscript for the former is now in the hands of the publishers and very likely the finished work will be on the market in the fall of 1942. The manuscript for the latter volume will be ready for the publishers at a reasonably early date.

It is hoped, too, that a single volume, containing the most important contributions in the same major sciences from 1900 to 1950 will be available by 1960, and then a similar volume each half century thereafter indefinitely, but this addition to the original plan is entirely in the laps of the gods.—GREGORY D. WALCOTT, General Editor.

Duration of Association Memberships

There are various criteria for determining the stability of a scientific society. One of them, and perhaps the best one, is the average number of years its members continue their memberships. It is a better criterion than the mere maintaining of total memberships, because dissatisfactions and resignations might be offset by aggressive recruiting of new members.

Probably the next best evidence relative to the success of a scientific society in serving its members is its record for continuous memberships. When demands on time and money on scientists become heavy, they naturally discontinue their memberships in societies that they do not regard as almost indispensable to them. An organization having a large number of memberships that have been maintained continuously for many years may be regarded as reasonably fulfilling its purpose.

The member of the Association with the longest continuous membership is Dr. Joseph Charles Arthur, emeritus professor of botany in Purdue University. He has been a member of the Association for seventy years, a fellow since 1883 and an emeritus life member since 1924. He was born in 1850 at Lowville, N. Y. At the meeting in Dubuque, Iowa, in 1872, the year of his election, there were only 610 members of the Association. Then he was one of the 600; now he is one of the 24,000. Dr. Arthur was Secretary of the Section on Botany in 1886, and Vice President of the Association for the Section on Botany in 1895.¹

¹In a letter recently received we are informed that Dr. Arthur died on April 30, 1942.

Only one year behind Dr. Arthur in length of membership is Dr. Robert H. Richards, emeritus professor of mining engineering and metallurgy in Massachusetts Institute of Technology. Dr. Richards, who was born at Gardiner, Me., in 1844, has been a member of the Association continuously since 1873, a fellow since 1875, and an emeritus life member since 1918. In addition to Dr. Arthur and Dr. Richards, there are 360 other persons, six of whom are women, who have been members of the Association for at least forty years. Of these 360 persons, 105 have been members of the Association continuously for fifty or more years.

At the other extreme, there are persons who die or resign after having been members of the Association for only a few years. Experience shows that most resignations are presented at the close of the first year of membership. Another critical time is that at which a member retires from active work, although most members maintain their wide contacts with science by continuing their memberships in the Association.

It is of course impossible to determine how long the present members of the Association will continue their memberships, but there is no uncertainty regarding those who have died, resigned, or failed to pay their dues. If the future can be predicted from the past, their membership records furnish a basis for determining, at least approximately, the life expectancy, to use a life insurance term, of the present memberships in the Association. The statistics are presented for the past eight fiscal years of the Association, the fiscal year beginning on October 1 and ending on September 30.

Fiscal year	Total membership	Memberships terminated	Average duration
1933-34	18,553	2,025	7.7 yrs.
1934-35	17,937	1,787	8.4 "
1935-36	18,242	1,208	12.0 "
1936-37	18,303	1,081	9.1 "
1937-38	19,347	1,112	12.2 "
1938-39	20,195	1,362	11.3 "
1939-40	21,067	1,323	8.6 "
1940-41	21,798	1,179	8.5 "
Average	19,430	1,385	9.7 yrs.

The considerable variations in the average durations of membership are at least partially explained by the fact that resignations occur, if at all, mostly at the close of the first year of membership. Consequently the average duration of membership terminating in any year will be longer than the average if the number of new members in the preceding year was below the average, and vice versa. As an illustration, the

average duration for memberships terminating in 1935-36 was 12.0 years, a high average, following only 1,171 new members in the preceding year. In contrast, the average duration of terminating memberships in 1940-41 was 8.5 years, a low average, following the enrolling of 2,195 new members, or nearly twice as many in 1939-40. Probably 9.0 years is a fair estimate of average life expectancy for memberships in the Association.

Every person who is a member of the Association for this average period of membership of nine years receives more than 10,000 pages of *Science* or *The Scientific Monthly*. If he takes *Science*, he has before him the addresses of nine presidents of the Association and of more than a hundred vice presidents, the reports of nearly twenty meetings at which more than 30,000 papers are presented, hundreds of special articles, and thousands of news articles about science and scientists in general. If he takes *The Scientific Monthly*, he may read approximately a thousand non-technical articles distributed widely over the broad fields of science and its applications and hundreds of illustrated brief articles on the progress of science, and reviews of hundreds of the best of the non-technical new books on science. Measured in terms of what a member of the Association receives, the average duration of membership is a long period indeed.—F. R. M.

New Officers of the Southwestern Division

At the meeting of the Southwestern Division of the Association, held in Las Cruces, N. Mex., April 28 to 30, 1942, the following officers were elected.

President, H. P. Mera, Laboratory of Anthropology, Santa Fe, N. Mex.

Vice President, F. H. Douglas, Denver Art Museum, Denver, Colo.

Members of the Executive Council, William M. Craig, Texas Technological College, Lubbock, Texas; E. H. Haury, University of Arizona, Tucson, Ariz.

Section on Biological Sciences: Chairman, E. F. Castetter, University of New Mexico; *Secretary*, Edna L. Johnson, University of Colorado.

Section on Mathematical Sciences (Southwestern Section of the Mathematical Association of America): *Chairman*, Emmett Hazlewood, Texas Technological College; *Vice Chairman*, P. M. Swingle, New Mexico State College; *Secretary*, H. D. Larsen, University of New Mexico.

Section on Physical Sciences: Chairman, O. B. Muench, New Mexico Highlands University;

Secretary, Parry Reiche, Albuquerque, N. Mex.

Section on Social Sciences: Chairman, F. H. Douglas, Denver Art Museum; *Secretary*, W. W. Postlethwaite, Colorado College.

The Division voted to hold its 1943 meeting in Colorado Springs, Colo., and the 1944 meeting in Phoenix, Ariz.

Fellows of the Association

Occasionally the Office of the Permanent Secretary receives inquiries concerning the number of Fellows included in the total enrolment of the Association, as well as the enrolment in the Sections. In fact the article on membership in the Association in the April number of the A.A.A.S. BULLETIN prompted questions on this subject. The following table briefly supplies the desired information. In the table the figures indicating the total enrolment are the same as appeared in the article above mentioned and are as of March 11, 1942.

Section	Members and fellows		Fellows only	
	Total	Per-cent	Per-cent total enrolment	Per-cent section enrolment
Mathematics	828	3.5	2.2	62.7
Physics	1,778	7.5	4.8	64.9
Chemistry	4,530	19.1	7.7	40.2
Astronomy	311	1.3	0.7	57.2
Geology and Geography	1,257	5.3	2.6	49.8
Zoological Sciences ..	2,882	12.2	6.1	50.7
Botanical Sciences ..	1,847	7.8	5.5	71.1
Anthropology	343	1.4	0.6	46.3
Psychology	1,264	5.3	2.3	43.4
Social and Economic Sciences	460	1.9	0.9	46.0
Historical and Philological Sciences	159	0.7	0.2	31.4
Engineering	1,577	6.7	2.2	33.0
Medical Sciences	4,101	17.2	6.8	39.4
Dentistry	246	1.0	0.2	17.0
Pharmacy	211	0.9	0.5	51.6
Agriculture	816	3.4	2.6	73.8
Industrial Science	34	0.1
Education	627	2.6	1.1	41.6
No section	495	2.1
	23,766	100.0	47.0

Inquiries are received from time to time asking for the distinction between members and fellows. Perhaps the best way to answer such questions is to quote from the By-Laws of the Association (Article II, Section 5):

"Members are eligible to nomination for fellowship if they have contributed to the advancement of science either by the publication of original research or in other significant manner. Nomination for election to fellowship may be made by any three fellows, by the Permanent Secretary or by any Section Secretary, but before being submitted to the Council every nomination shall have been first approved by the section committee in whose field the nominee's scientific work mainly lies."

Although nominations for fellowship (in most cases) originate in the section committees through routine methods, there are other nominations that come by way of those who are already Fellows. Fellows or members may obtain a special blank form from the Office of the Permanent Secretary for this purpose and they are encouraged to do so. Nominations by this procedure are invaluable to the Secretary of the Section, especially in the cases of individuals who may be personally unknown either to the Secretary or to the members of the Section Committee.—S. W.

Gibson Island Conference on Vitamins (Revised Program)

July 20

Multiple Nature of Vitamin A. Norris Embree, Distillation Products, Inc.

Experimental and Clinical Studies of Vitamin A. J. M. Lewis, Beth Israel Hospital, New York.

Present Status of the Vitamin D Problem. James Waddell, E. I. du Pont de Nemours and Company, Inc.

July 21

Mechanism of Vitamin C Activity. Histochemistry of Collagen and Bone in Scurvy. B. S. Gould, Massachusetts Institute of Technology.

Para-aminobenzoic Acid. Experimental and Clinical Studies. S. Ansbacher, American Home Products Corp., Richmond Hill, N. Y.

Newer Members of the Vitamin B Complex. D. W. Woolley, Rockefeller Institute for Medical Research.

July 22

Some Aspects of the Chemistry and Biological Behavior of Biotin. V. du Vigneaud, Cornell University Medical College.

Fatty Acids and their Relation to Members of the Vitamin B Group. E. W. McHenry, University of Toronto and Connaught Laboratories.

National Nutrition Program. W. H. Sebrell. National Institute of Health.

July 23

Riboflavin Assay Methods. J. S. Andrews, Research Laboratories, General Mills.

Vitamin A and Thiamin Deficiencies and the Nervous System. O. A. Bessey, Public Health Research Institute of the City of New York.

Methods Used in Detection of Malnutrition. J. B. Youmans, School of Medicine, Vanderbilt University.

July 24

Therapeutic Measures in Vitamin Deficiencies. Norman Jolliffe, Bellevue Hospital.

Experimental Vitamin B Group Deficiencies in Swine. M. M. Wintrobe, Johns Hopkins University.

Science Carries on at Chicago

From Monday, June 22, to Thursday, June 25, inclusive, a "Spectroscopy Conference" will be held at The University of Chicago, consisting of eleven sessions at which 27 papers will be presented. The general subjects of the successive sessions are:

1. Spectroscopic Methods.
2. The Spectra of Comets.
3. Spectroscopic Applications of Atomic Beams.
4. The Earth's Atmosphere and The Constitution of the Planets.
5. Atomic Spectra.
6. Triatomic Spectra.
7. Electronic Spectra of Organic Molecules.
8. Spectra of Dye Molecules.
9. Electronic Spectra of Organic Molecules.
10. Cooperative Spectra.
11. Spectra of Ion Complexes.

The Association from 1861 to 1870

During the thirteen years between the founding of the Association in 1848 and 1861 the Association held fourteen meetings. Many of the addresses delivered at these meetings contained enthusiastic and eloquent passages concerning the progress of civilization, the dissipation of dark superstitions, the increase in understanding of the beneficent purposes of the Creator and confident predictions of a glorious future. Then the Civil War broke out.

In April, 1861, the blood of men ran hot. Those who together had won their political freedom became bitter enemies; the aid of the Almighty was invoked in plans for slaughter; mutual hatreds flamed in the hearts of those who had been friends; families were divided by undying enmities; large sections of the country were laid waste and all of it was impoverished. For six years the Association held no meetings.

The first meeting of the Association after the termination of the Civil War was held at Buffalo, N. Y., in August, 1866. But it was not such a meeting as the previous ones had been. It was not such a meeting as the one scheduled for Nashville, Tenn., for April, 1861, would have been if it had not been for the outbreak of the war. Yet 79 members of the Association attended the meeting and 67 papers were presented, 18 of which

were printed in the Proceedings of the meeting. Of these 18 papers, only one was in zoology and only one was in botany.

In 1859, shortly before the decade under consideration, a great book was published, Charles Darwin's *Origin of Species*. It is difficult for scientists of the present day to appreciate the revolutionary character of the ideas it contained and the profound effects it had upon scientists. It transformed their whole outlook upon biology; it raised deep questions concerning the origin and destiny of man. Naturally the revolutions in thought it produced were reflected in the meetings of the Association.

At the meeting of the Association held in Burlington, Vt., in August, 1867, J. S. Newberry (geology), in his address as president of the Association, referred to the *Origin of Species* and the question it raised as follows:

It would be impossible for any one to discuss in a fair and intelligent manner the great question of the origin of species, in anything less than a bulky volume. The merest mention is, therefore, all we can give to it at the present time. Although the appearance of Darwin's book on the *Origin of Species* communicated a distinct shock to the prevalent creeds, both religious and scientific, the hypothesis which it suggests, though now for the first time distinctly formularized, was by no means new; as it enters largely into the less clearly stated development theories of Oken, Lamarck, De Maillet, and the author of the "Vestiges of Creation." There was this difference, however, that in the developmental theories of the older writers the element of evolution had a place; the process of development had its mainspring in an inherent growth, or tendency, such as produces the evolution of the successive parts in plantlife, while, according to Darwin, the beautiful symmetry and adaptation which we see in nature is simply the form assumed by plastic matter in the mould of external circumstances.

Although this Darwinian hypothesis is looked upon by many as striking at the root of all vital faith, and is the *bête noire* of all those who deplore and condemn the materialistic tendency of modern science, still the purity of life of the author of the "Origin of Species," his enthusiastic devotion to the study of truth, the industry and acumen which have marked his researches, the candor and caution with which his suggestions have been made, all combine to render the obloquy and scorn with which they have been received in many quarters peculiarly unjust and in bad taste. It should also be said of Mr. Darwin that his views on the origin of species are not inconsistent with his own acceptance of the doctrine of Revelation; and that many of our best men of science look upon his theory as not incompatible with the religious faith which is the guide of their lives, and their hope for the future. To these men it seems presumption that any mere man should restrict the Deity in His manner of vitalizing and beautifying the earth. To them it is a proof of higher wisdom and greater power in the Creator that He should endow the vital principle with such potency that, pervaded by it, all the economy of nature, in both the animal and vegetable worlds, should be so nicely self-adjusting that, like a perfect machine from the hands of a master maker, it requires no constant tinkering to preserve the constancy and regularity of its movements.

Affiliated and Associated Societies

Only a few national scientific societies were organized during the first thirty or forty years after the founding of the Association in 1848. Naturally the meetings of the Association were the principal scientific gatherings during this period. From time to time the specialists in the fields of the Sections of the Association established their own societies—the chemists in 1876, the botanists in 1894, the physicists in 1899, the zoologists in 1903.

It was natural that these special societies should be given some organic relation to the Association. In 1899, for the first time, the constitution of the Association referred to "affiliated societies." But at that time an affiliated society was simply one that was given the designation by the Council so that its members might become "associate members" of the Association for a meeting upon the payment of three dollars. The present definition of "affiliated" and "associated" societies first appeared in the constitution that was adopted in 1920. There are now 135 affiliated scientific societies, including 34 academies of science, and 51 associated scientific societies and organizations.

Affiliated and associated societies are societies whose purposes, organizations and activities have been approved by the Council by admitting them into one of these relationships with the Association. Affiliated and associated societies pay no entrance fees or dues and are invited to hold their meetings simultaneously with, and in cooperation with, the meetings of the Association. When affiliated and associated societies meet with the Association, the office of the Permanent Secretary arranges for their headquarters, meeting rooms and necessary equipment. The outstanding features of their programs are included in the preliminary announcements of the meetings of the Association and the Permanent Secretary's reports of the meetings that are published in *Science*. The complete programs of their meetings are included in the General Programs of the meetings of the Association.

The only practical difference between the relationship of an affiliated society and an associated society with the Association is that the former has representation on the Council and the latter does not. If an affiliated society has more than 100 members who are fellows of the Association, it has two representatives on the Council; otherwise it has only one.

Associated and affiliated societies whose interests are limited to a recognized field of science cooperate with the corresponding sections of the

Association, and their representatives on the Council are *ex officio* members of their Section Committees. For example, the American Physical Society cooperates with the Section on Physics. It is the policy of the Association for its sections to cooperate, rather than compete, with their related affiliated and associated societies. Some sections hold only one or two sessions of invited papers by eminent specialists in their fields, leaving the major part of the programs to the affiliated and associated societies.

There are some affiliated societies, such as the Society of the Sigma Xi, whose interests are not limited to special fields. Their representatives on the Council are assigned to the section committees of the sections in whose fields the representatives' chief interests lie.

The steps to be taken by a society to become an affiliated or associated society are: First its secretary files with the Permanent Secretary an application for the relationship, a copy of its constitution and by-laws, a list of its members and a copy of its publication, if it has any; then the application and accompanying data are presented by the Permanent Secretary to the Executive Committee, which makes its recommendation to the Council.—F. R. M.

Human Malaria to be Reprinted

Late last summer the Association published "Human Malaria," an illustrated volume of viii plus 398 pages, the subtitle of which is "With Special Reference to North America and the Caribbean Region."

The book on malaria was published at a very opportune time for it came out just as the U. S. Army and the U. S. Navy began to establish many new stations and naval bases in the tropics. It is proving to be of great usefulness to both branches of the service in protecting our armed forces against a serious disease. The Medical Corps of both the Army and the Navy purchased copies of the book in considerable numbers for the use of health officers at all their stations in the tropics and in other places where malaria is prevalent.

Although 1500 copies of Human Malaria were printed, the edition has been completely exhausted. Since the materials in the volume are greatly needed for use in protecting our soldiers, sailors and marines against malaria, a limited number of additional copies will be produced in the original format and binding by a photographic process. As in the first printing, the price to members of the Association for cash orders will be \$4.50, postage prepaid, and to

those who are not members of the Association, \$5.00.—F. R. M.

Aerobiology

A symposium on Aerobiology was presented at the Chicago meeting of the Association, held jointly with The University of Chicago in connection with the celebration of the fiftieth anniversary of the founding of the University on September 22 to 24, 1941. The symposium was organized by the Section on Medical Sciences of the Association and the Committee on Aerobiology of the National Research Council. The papers are to be printed in one volume under the headings of "Extramural Aerobiology" and "Intramural Aerobiology." In the former there are eight papers and in the latter there are 29 papers, a total of 37. Altogether 55 persons contributed to this comprehensive and documented volume.

Extramural Aerobiology

It is clear from the symposium papers that aerobiological investigations have contributed much to an understanding of the epidemiology of plant diseases and toward elucidating the reasons for varying plant disease situations. Considerable knowledge has been obtained regarding aerial dissemination of fungus spores, algae, certain insects, allergenic pollens and many other biological objects.

It is now known that many plant pathogens depend almost exclusively on air currents for local dissemination and that certain kinds of pathogens can be distributed quickly and effectively over large land areas. New parasitic strains of plant pathogenic fungi may be produced as a result of hybridization between existing strains, or as a result of mutation, and become established over large continental areas as a result of wind dissemination of spores. Some of these fungi, particularly obligate parasites, can be traced to their original source and are therefore particularly suitable for studies designed to answer questions regarding how far spores and pollens are carried in viable conditions and the factors that affect the establishment and multiplication of fungi.

That intercontinental dissemination of spores and pollens is at least theoretically possible is indicated by the results of exposing spore traps from airplanes flying at high altitudes. It is now known that spores and pollens may occur in considerable number at least 10,000 feet about the earth's surface and in smaller numbers at altitudes twice as high, and that they may be found over the ocean at considerable distances from land.

There is considerable information regarding wind dissemination of fungus spores and of pollen grains, but very little is known about the possible dissemination of other microscopic biological objects, particularly bacteria and viruses. Can bacteria that cause human diseases, animal diseases, and plant diseases be transported long distances in viable condition as some fungus spores are? Certainly some of the plant pathogenic bacteria and certain soil bacteria retain their viability for many months. It has been proved that epidemics of certain plant diseases can spread over thousands of square miles in one growing season as a result of wind-blown inoculum. It

is true that these diseases are caused by fungi, but are fungi and bacteria entirely different as concerns wind dissemination? That living bacteria may be present at high altitudes has been shown by using an ingenious automatic spore-trapping device on airplanes. Is it possible that animal pathogens, including those of human beings, might be carried long distances by air currents, at least occasionally and under especially favorable conditions? As to viruses, some of those that cause plant diseases retain their infectivity in dry condition for many years. Are they not disseminated by the wind? And is there good reason why the same might not be true of viruses that cause diseases of human beings and domestic animals? The difficulties in investigating this relatively unexplored field are numerous.—E. C. STAKMAN, University of Minnesota.

Intramural Aerobiology

Knowledge of the way in which a disease is transmitted from person to person is essential for preventing its dissemination. For example, the control over epidemic intestinal diseases had to await the discovery that the causative organisms are transmitted by water and food. Sanitary measures have almost completely stamped out these diseases. Yellow fever remained a dreaded disease until the role of mosquitoes had been established and appropriate control measures had been adopted. But poliomyelitis still has its victims because the method of its dissemination has not been found.

In striking contrast to infections which are transmitted by water, milk and other food, the respiratory diseases have not been brought under control. Public health measures, such as quarantine, directed against them have been lacking in success. In retrospect, it is clear that failures and pessimism regarding control of these diseases has been due, at least in part, to lack of recognition of the fact that air is the major vehicle by which they have been spread.

Fortunately the situation with respect to respiratory infections is rapidly changing, aided greatly by the publication of the symposium volume on Aerobiology by the Association, a large part of which is devoted to airborne infection and means for its control. This volume begins with the work of Drs. W. F. and Mildred W. Wells who, in 1933, advanced the theory that invisible infective residues of droplets sneezed, coughed and spoken into the air are important means of respiratory infection and follows through to their demonstration that epidemics of mumps, chickenpox and measles can be checked by ultraviolet irradiation of school rooms. It reports dramatic reductions in postoperative infections by ultraviolet irradiation, and the control of infection in founding institutions. It discusses also the use of dilute vapors and mechanical barriers for protection against infection. By the use of still and motion pictures taken with stroboscopic light it dramatically illustrates that thousands and even tens of thousands of droplets are expelled during sneezing.—STUART MUDD, University of Pennsylvania.

The volume, consisting of 290 pages, is now on the press and will be ready for distribution in June. The prepublication price to members, until August 1, 1942, is \$3.00; after that date the price will be \$3.50. To others the prepublication price is \$3.50; after August 1 the price will be \$4.00.

Officers of the Association

President, Arthur H. Compton; *Permanent Secretary*, Forest R. Moulton; *General Secretary*, Otis W. Caldwell; *Treasurer*, C. Carroll Morgan; *Assistant Secretary*, Sam Woodley.

Executive Committee: Burton E. Livingston, *Chairman*; Roger Adams, Joseph W. Barker, Otis W. Caldwell, Walter B. Cannon, J. McKeen Cattell, Roy E. Clausen, Arthur H. Compton, Esmond R. Long, F. R. Moulton, and W. E. Wrather.

Membership in the Association

According to the Constitution, the objects of the Association are to promote intercourse among those who are cultivating science in different parts of America, to cooperate with other scientific societies and institutions, to give a stronger and more general impulse and more systematic direction to scientific research, and to procure for the labors of scientific men increased facilities and a wider usefulness. Members may reside in any country. A person desiring to become a member of the Association should fill in a membership application card that may be obtained from the Office of the Permanent Secretary and return it with his payment of \$5.00 for one year's dues. Every member in good standing receives with his membership a subscription for either *Science* or *The Scientific Monthly*. Dues are for the fiscal year that begins October 1; the subscription begins the following calendar year. A member desiring to receive both journals concurrently may do so by paying \$3.00 in addition to the regular dues. Members in good standing receive also, without extra charge, subscriptions for the A.A.A.S. BULLETIN, and they may purchase symposia publications at prepublication and post-publication reduced prices.

A person who pays \$100 may be elected a life member; sustaining members pay \$1,000. Both classes are exempt from the payment of further dues but are entitled to all the privileges of membership.

An incorporated scientific society or institution or a public or incorporated library may become a member by paying the entrance fee of \$5.00 in addition to the dues. Such institution members are entitled to the same privileges as individual members.

Members are encouraged to nominate for membership persons who desire to cooperate in carrying out the objects of the Association. Names may be sent to the Office of the Permanent Secretary at any time. In the letter of invitation to become a member of the Association the name of the person making the nomination is mentioned if that is desired.

Changes of Address

New addresses for the Association's records and for mailing the journals *Science* and *The Scientific Monthly*, as well as the A.A.A.S. BULLETIN, should be in the Office of the Permanent Secretary, Washington, D. C., at least two weeks in advance of the date when the change is to become effective.

